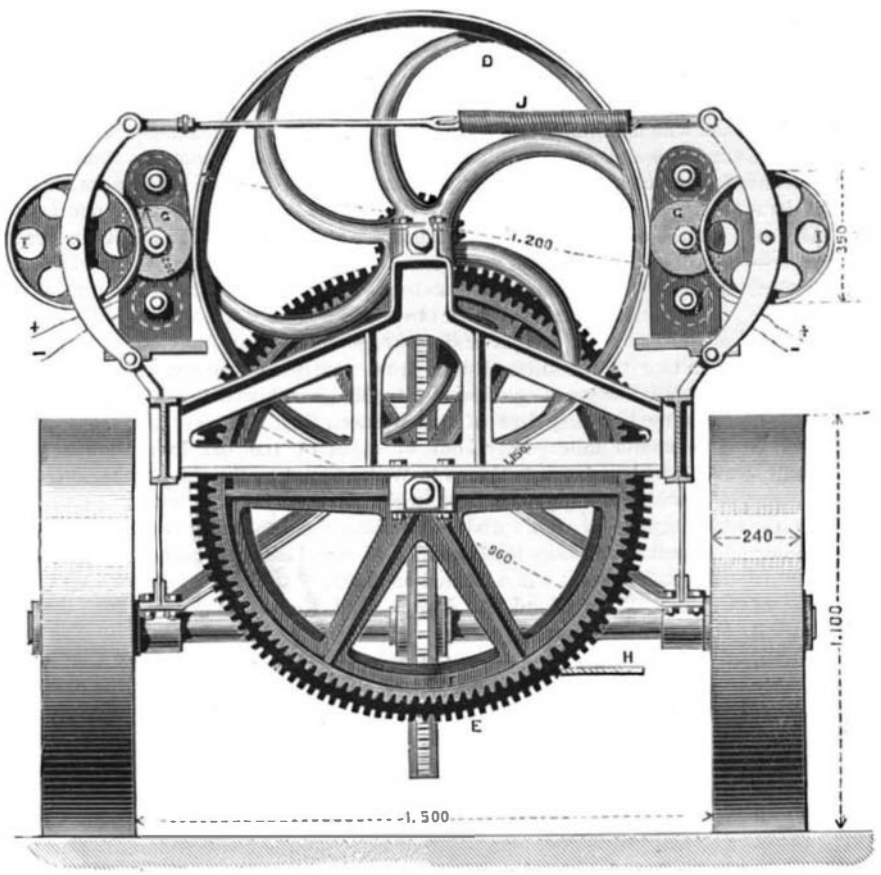
PLOWING BY ELECTRICITY.

Experiments have just been made at Sermaize (Marne), France, with a new system of mechanical plowing, the invention of MM. Chrétien & Félix, two engineers of the above place, who are already favorably known to the industrial world.

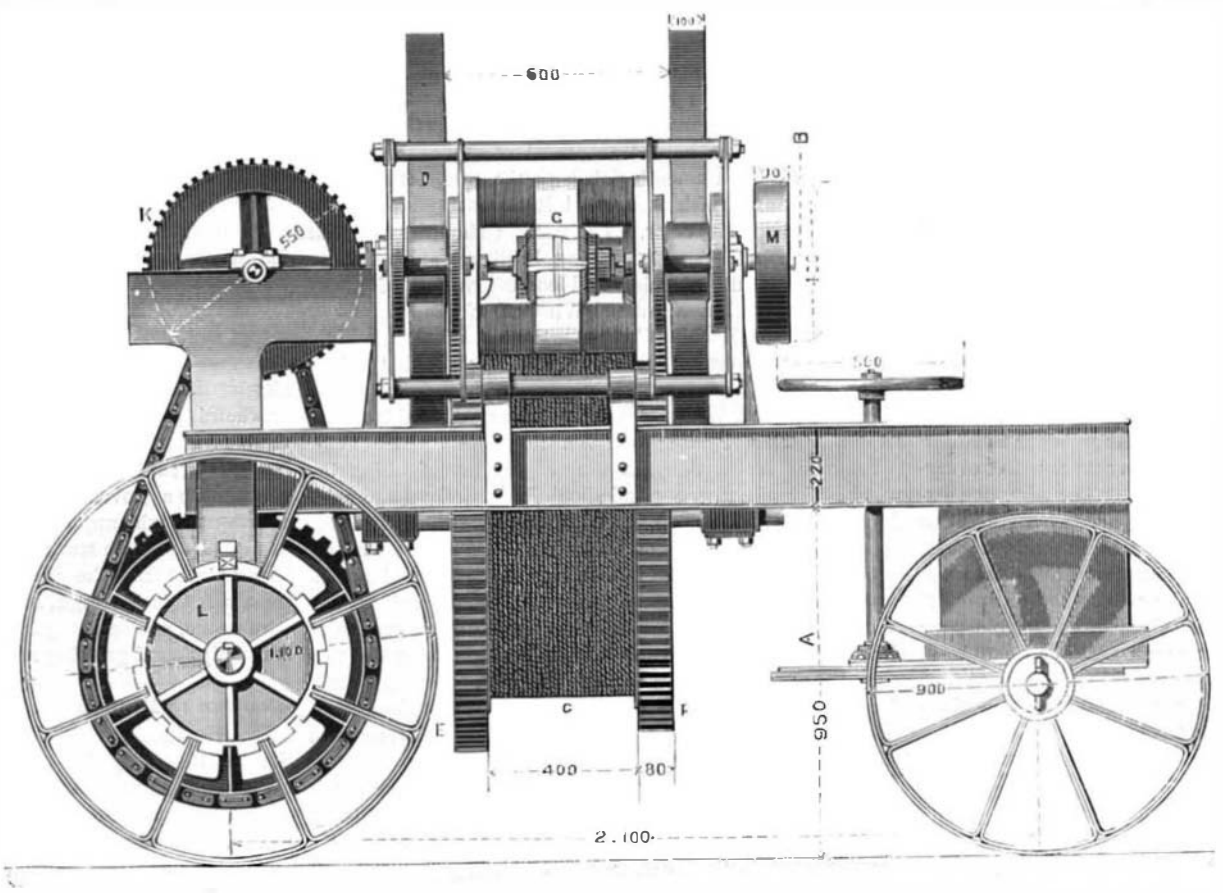
Tillage by mechanical power, as practiced at present in England, the United States, and some parts of France, is based on the use of locomotive steam engines placed on a headland and actuating drums over which passes an endless steel rope serving to carry the plow back and forth over the field. These machines are very high priced; it costs a great deal to manage them and keep them in repair. Special care has to be exercised to make them work well; they are difficult to manage in the fields, especially in rainy weather; and, finally, they require a considerable supply of water. The work, however, is better done; and the deep tillage of the soil that mechanical plowing alone can effect, multiplies the nutritive surfaces of the arable layer and gives a mean increase of 30 per cent. in crops. But in spite of all its advantages, steam plowing has made little headway in France, both on account of the parceling out of the lands among numerous proprietors, and the inconveniences that we have just enumerated.

With a view to the more general adoption of mechanical power on farms, the engineers mentioned above have devised an arrangement by which motive power in a certain fixed position may be employed to do the work of several adjacent farms through the medium of electricity as an agent of transmission. They have for this purpose adopted the Gramme dynamo-electric machine for the generation of electricity, and similar machines as the electro-dynamic agent for reconversion of the electricity, conveyed to any required distance by cables, into motive power.

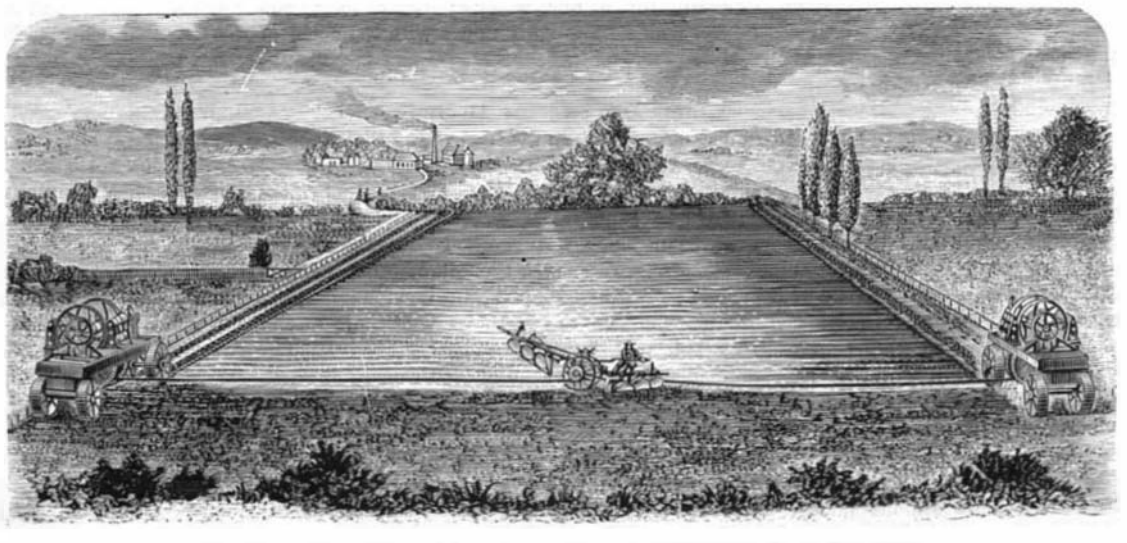
Two forms of these machines have already been established and experimented with at Sermaize—one of them designed for unloading beet boats, and the other for plowing. The former was in operation all of last winter, and its use was found to effect a saving of about 40 per cent over manual labor. Besides this, the beets were unloaded very much quicker (a matter of capital importance in the sugar-making industry) and without the aid of special workmen, who cannot always be depended upon. Within the past few weeks the power has been transmitted to some neighboring fields, which have been plowed by a balance plow and the windlasses which we illustrate herewith. Each of these consists of a carriage of wrought iron, the two side frame pieces being of I section, mounted on four iron wheels. Two Gramme electro-dynamic machines, G G, are mounted on a hinged frame attached to the side frames. These machines are connected together at their upper parts by means of a simple connecting rod and a pair of India rubber rings (the arrangement of friction wheel, I, and the spiral spring, J, was removed after trial, as not giving sufficient rigidity, though the friction was very small), which hold the pulleys on the end of the Gramme machine spindles, against the pulleys, D D. The small pulleys in the Gramme machines are recovered with gutta percha. The hauling drum, C, receives the movement of the pulleys, D, by means of the pinions, E or F, which give the slow or fast speed respectively. Upon the end of the spindle carrying the pulleys, D, is fixed a bevel pinion gearing with the bevel wheel, K, upon the shaft carrying which is a pitch pinion, over which and the wheel, L, runs a pitch chain, by which the headland movement of the windlass is obtained. The steering of the windlass is effected by the hand wheel, as shown in front. For working, the hind wheels are fixed upon the axle by a set screw, which is loosened for traveling. The rope, H, is of steel, half an inch diameter and 1·3 miles in length, as used at Sermaize. The electric cables are carried on posts, as for telegraphic purposes. They consist of wires each 0·04 inch in diameter, giving a total sectional area of about 0·33 inch. In the experiments the windlasses, constituted as above, were placed at a distance of 664 feet apart, and by means of commutators the electricity was alternately passed through the one and the other pair of machines as the plow crossed and recrossed the field. An engine in the sugar factory already mentioned, and situated 1,300 feet from the field, gave motion to the dynamo-electric machines which supplied the electricity, about eight horse power being employed. When in light ground two furrows have been made, but in heavy ground only one, the power transmitted to the plow being but that of three to four horses. The designers will, however, soon have machinery ready which will enable them to use a four furrow plow.



TRANSVERSE SECTION ON LINE A B.



APPARATUS FOR PLOWING BY ELECTRICITY.



PLOWING BY ELECTRICITY AT SERMAIZE, FRANCE.

The gramme machines at the works were driven at 1,600 revolutions per minute, while those on the windlasses made 800 per minute. The pulleys, D, made 133 revolutions per minute, and the hauling drums 14 and 27 under the slow and fast speeds respectively, the corresponding speeds of the plow being 164 and 266 feet per minute. The furrows were 10·8 inches wide and 7·87 inches deep. Making two furrows, about 24 square yards were plowed per minute. It was found that about 50 per cent of the work of the fixed engine was realized on the field, and that the efficiency of the electro-dynamic apparatus is from 30 to 60 per cent, according to the distance of transmission.

It is urged that the apparatus will provide in France the means of supplanting much hand labor, which is somewhat scarce, and that by its means many falls of water not now used may be usefully employed for generating power for transmission. Our illustrations are copied from those which have appeared in the *Revue Industrielle*.

NEW AGRICULTURAL INVENTIONS.

An improvement in check row corn planters, consisting chiefly in the peculiar arrangement of devices for imparting motion from the drive shaft to the feed slides, and in a contrivance for throwing the slide-operating mechanism into and out of gear, has been patented by Mr. Charles G. Everet, of Belfontaine, O.

Mr. Aaron F. French, of Denison, Iowa, has patented an improved harrow, having its tooth bars connected by tubes threaded externally to receive the nuts by which the bars are held in place, and threaded internally to receive the hooks and eyes that connect the different sections of the harrow.

A new machine for planting corn in hills at a uniform distance apart has been patented by Mr. Theodore F. Tanner, of Jefferson City, Mo. It consists of a frame, carrying seed boxes, mounted on wheels, and provided with valves and slides that are opened at regular intervals by connections from the driving wheels of the apparatus.

An improved fertilizer distributer has been patented by Mr. William Hodges, of Okolona, Miss. The machine is provided with a hopper having hinged ends that are connected with a shaft or roller so that they may be drawn inward to aid in the discharge of the fertilizer.

Messrs. Arthur C. and Reuben W. Sriver, of New Baltimore, O., have patented an improved harvester reel and dropper, the principal features of which consist in novel means for regulating the vertical adjustment of the reel above the cutter bar, and in a device for intermittently discharging the cut grain.

Petroleum as a Steam-Maker.

To-day there are 7,000,000 barrels, of 40 gallons each, of crude petroleum above ground in the oil regions. This vast accumulation of heat and light producing material is going a begging at 64 cents per barrel. Every hour adds to this ocean of oil; in spite of the enormous consumption the stock accumulates. Every new use to which petroleum is applied possesses interest to producers, and the day that shall see crude oil take the place of coal as a steam producer will be a glad day for mankind in general and oil men in particular. That such a day is not very far distant seems evident after an inspection of the working, recently, of an oil burning device tested on a river steamer at the Monongahela wharf.

A representative of the *Telegraph*, with a number of river men and steamboat owners, was present upon the occasion, and the object of this article is to briefly set forth the claims to public attention possessed by the device under consideration. The invention is the property of the American Hydro-Carbon Gas Company—John Campbell, General Manager—and embraces simple but vital principles of construction, wherein atmospheric air and steam are combined in proper proportions with oil, and injected into the firebox beneath the boilers in the form of spray. The latter being immediately converted into inflammable gas becomes a pure, bright, powerful flame, devoid of smoke and producing intense heat.

To accomplish this result extremely simple machinery is used. A small hole is drilled into the iron front of the firebox, and into this passes a tube which branches as it leaves this point into two pipes. One of these connects with the boiler itself, and the other with the receptacle containing crude oil. At the juncture of these pipes there is an aperture for the admission of outer, or atmospheric air. Valves of peculiar construction regulate the quantity of steam or oil admitted to the furnace. This is all the machinery required, but its operation is wonderfully complete and remarkably successful.

The little steamer Billy Collins was selected by Mr. Campbell for the test and was fired up at 9 A.M. A preliminary blaze of wood under the boiler raised the small quantity of steam necessary to start the burner into operation. The oil valve was opened a trifle, the steam valve ditto. The petroleum trickled into the feed pipe, was caught up by the steam, and both plunged into the depths of the firebox, a mass of many-tongued, roaring, brilliant flame. As the pressure of steam increased, this flame grew in fury and intense heat, roaring through the entire length of the boiler with a sound like the coming of a thunderstorm. The needle of the steam gauge climbed rapidly up the dial, and in twenty minutes the safety valve blew off at 120 pounds pressure. It was a remarkable sight. Here was a boat puffing through the water with no sign of smoke from her chimneys, no speck of soot in flues or firebox, no fireman, no opening of furnace doors, no dirt, no coal going in, and no clinkers or ashes to be seen anywhere. A turn of the hand regulated the terrible flame that seemed trying to overpower the limits of the furnace, and another turn of the hand brought the fire down to a quiet little flame, a foot or two long. During the forenoon occupied by the test, about 20 gallons of crude oil were consumed, and Mr. Campbell's estimate was, that with oil at one dollar per barrel, this fuel was equivalent to coal at six cents, in heat producing value, other things being equal.

But other things are not equal, by any means, and everything is in favor of oil as against coal. The labor and expense of "firing up" is dispensed with, and the engineer can regulate the flame as he does the steam in his engines. The danger from sparks and flying cinders is entirely done away with. The space occupied by oil, as compared to an equal value of coal, is very much less, and this much is gained for cargo. Further, the wear and tear upon boilers, grate bars, etc., is infinitely less, and, it seems scarcely necessary to add, the comfort of passengers is greatly enhanced by the absolute freedom from dirt of all kinds.

To the western boatman this method of steam producing is full of interest. "Coal is coal" on western rivers. Here is a fuel that seems provided by nature especially for use on craft where every atom of carrying space is valuable.

To ocean going steamers this device must prove of extraordinary interest. A tank of oil situated at a remote end of the ship would hold fuel sufficient for a double trip, and supplant the great coal bunkers with their attendant dirt. Space prevents even a glance at the possibilities of this burner on the ocean.

To railroad men this burner is full of promise also. A locomotive boiler, with its many tubes, would be pierced in every part with this wonderful oil flame, and the benefits arising from the entire absence of sparks, cinders, and smoke are simply incalculable. In fact the "hydrocarbon" folks have got a "big thing," and upon their success in introducing their device to the public, and in overcoming popular prejudices, depends not a little the future of the oil trade.—*Pittsburg Telegraph.*

The Missouri River.

To be appreciated Missouri River must be seen and heard during the April or June rise, when its waters are red and thick with the powdered soil they have brought from the mountains and stolen from the farms in the valleys. Then it pours and swirls and eddies along with a treacherous sound between a chuckle and a half suppressed whisper, that repels while it fascinates the listener. It made millions of acres of rich black deposits, on which it still holds a mortgage, the foreclosure of which no man can foresee. Hundreds of farmers, after clearing away the heavy timber and raising fine crops year after year, on their eighty or more acres of deep, inexhaustible river bottom, have seen their entire possessions swept away in a few days by a sudden and unexpected "change of channel" during an April or June "rise." These changes of channel have different causes. Sometimes a giant cottonwood tree that has been uprooted where the river has risen upon the forest above, is borne down by the current and lodged in the mud, where it will gradually become embedded in the yielding bottom, and perhaps lie in wait for months, or even years, without giving any particular sign of existence. At last an unusual rise takes place, and then this hidden "snag" creates a diversion in the strong current, which begins to circle round the spot, and which culminates in a boiling eddy. The eddy increases in depth and force, gradually diverting the water from its former course until a new pathway is formed in the river bed.

If the eddy is located near the shore at the upper edge of a promontory, and the water is sufficiently high to overflow the flats, a new channel is sometimes carved straight across some valuable farm or timber strip, and a river town, where steamboats took freight and passengers last year, may be from two to six miles distant from navigable water next year. A few years ago Forest City, Mo., was kissed day and night by the dirty lips of this Western flirt. To-day the river sports miles away, out of sight of the old love, and is whispering soft things to White Cloud on the Kansas side, which has gained a river, while the State has lost several thousand acres of productive cotton land that now supports cattle and hogs in Missouri. Missouri River towns are never safe, except when located on bluffs, or table lands, like Omaha, White Cloud, St. Joseph, and Kansas City.—*St. Paul Pioneer Press.*

Suggestions on Wood Finishing.

As the old methods of finely finishing hard woods have all been slow and expensive, the larger portion of hard woods used in furniture, musical instruments, buildings, etc., have been allowed to pass without a proper finish, and the beauty of effect sought in the use of such woods has not been fully realized.

Our American hard woods were formerly so very plentiful and cheap that their true merits were not properly appreciated; but now that they are becoming scarce and expensive, they are beginning to be highly prized.

There is scarcely anything more beautiful than the variegated colors and grains of many varieties of our hard wood when developed by a proper finish.

This, however, cannot be done without filling the softer or porous parts with a hard, transparent substance, and at the same time giving a smooth polish to the compact solid, so that when the varnish is applied it cannot strike into the wood and change its color. The varnish should merely lie smoothly upon the surface, giving brilliancy and effect to the natural beauty of color and endless variety of grain. Not long since Mr. Nathaniel Wheeler, of the Wheeler & Wilson Sewing Machine Co., patented a wood filler, which, from the testimony of those who have used it, is the best article for the purpose yet produced. It is extensively used by the Wheeler & Wilson Sewing Machine Co., and is adapted to all classes of hard wood work.

From the best authorities the old practice of oiling the wood is altogether wrong and should be entirely abandoned. Any one at all skilled in the art of wood-finishing will see, upon a moment's reflection, that a coat of oil applied directly to the wood has the effect of swelling the fibers, and retaining them in that condition until the oil becomes entirely dry or disappears. During all this time the fibers are gradually shrinking, and consequently moving and checking the varnish. Oil also "burns" the wood, and in time gives it a dark, disagreeable color, quite obliterating the lighter shades and destroying the contrast which is the most important element of its beauty.

The use of scraping varnish for polished work, although long practiced for the want of something better, is not only slow and expensive, but otherwise objectionable.

The application of several coats of poor rosin varnish, as a foundation for durable work, is inconsistent. A little reflection should satisfy any one that such a filler cannot possibly be as good as one composed of a hard, tough substance, prepared especially for the purpose by a person of long practical experience, which thoroughly unites with the fibers of the wood.

Lime Juice versus Alcohol.

There are visible signs of no uncertain kind that alcohol, as a beverage, is not likely in the future to have quite its own way, even in the metropolis. Coffee taverns and coffee tavern companies are being established now at a rapid rate, and, as far as we can judge, have worked very successfully. But before these places were much thought of—that is, about two years ago—those who looked about them might have observed in the windows and at the bars of most public houses, eating houses, and ginshops, more or less conspicuous advertisements of several varieties of so called lime juice beverages. We have at the present moment before us examples of several of this kind, and there is no doubt that, particularly during the warmer months (though these, by the way, are now few and far between), lime juice and its components constitute among the metropolitan public an exceeding popular drink.

Most people have had, or think they have had, at one time of life, some variety of cutaneous affection, which often takes the convenient synonym of scurvy. And as the latter disease was not many years since much written and talked about in connection with the mercantile marine, and still more, two years ago, in connection with the Royal Navy, we cannot be much surprised at the success of those who endeavor, for commercial purposes, to promote the sale of such drinks. It seems, however, that they do not meet with the unqualified approval of publicans, or rather of distillers and brewers. The former are now absolutely compelled to keep them, to sell them, and to advertise them. But, if we are correctly informed, the poor man's friend, in the shape of the licensed victualer, deprecates the imbibition of lime juice in any form whatever. He sells it because the inevitable law of commerce—that is, supply and demand—compels him to do so. But he will tell the individual who asks for a glass that it promotes acidity of the stomach, that it deranges the kidneys, congests the liver, corrodes the intestinal canal, and so on, and then the customer is told that he had much better keep to the old glass of "bitters" or "gin," etc.

Being tolerably certain that the reports as to this sort of gossip are substantially correct, we counsel the public to turn a deaf ear to such elaborate and ignorant nonsense, and to drink their lime juice whenever and wherever they list. There are with this as with other liquids pure and adulterated varieties, and as to this matter they must, of course, use their own judgment. But they may be assured that, as a rule, lime juice is, particularly during the summer, a far more wholesome drink than any form of alcohol, and that, say, an ounce or two of the pure juice in a tumbler of really cold water, sweetened to taste, is about the pleasantest beverage that can be taken when the thermometer is over 65° or 70° Fah. We commend this drink to the attention of the coffee tavern companies, but recommend them to procure the best West India lime juice, as more wholesome than any mixture containing other ingredients.—*Lancet.*

The Stinging Tree.

Though the tropical scrubs of Queensland are very luxuriant and beautiful, they are not without their dangerous drawbacks, for there is one plant growing in them that is really deadly in its effects—that is to say, deadly in the same way that one would apply the term to fire; as, if a certain proportion of one's body is burnt by the stinging tree, death will be the result. It would be as safe to pass through fires as to fall into one of these trees. They are found growing from two to three inches high to ten and fifteen feet; in the old ones the stem is whitish, and red berries usually grow on the top. It emits a peculiar disagreeable smell, but it is best known by its leaf, which is nearly round, having a point on the top, and is jagged all round the edge, like the nettle. All the leaves are large—some larger than a saucer.

"Sometimes," says a traveler, "while shooting turkeys in the scrubs I have entirely forgotten the stinging tree till warned of its close proximity by its smell, and I have then found myself in a little forest of them. I was only once stung, and that was very lightly. Its effects are curious. It leaves no mark, but the pain is maddening, and for months afterward the part, when touched, is tender in rainy weather, or when it gets wet in washing, etc. I have seen a man who treats ordinary pain lightly roll on the ground in agony after being stung; and I have known a horse so completely mad after getting into a grove of the trees that he rushed open-mouthed at every one who approached him, and had to be shot in the scrub. Dogs when stung will rush about, whining piteously, biting pieces from the affected part." The small stinging trees, a few inches high, are as dangerous as any, being so hard to see, and seriously imperiling one's ankles. The scrub is usually found growing among palm trees.

Caution to Draughtsmen.—Arsenic in Water Colors.

Dr. H. Fleck, in the *Chemiker Zeitung*, calls attention to this subject by the sudden death of a mechanical draughtsman. On a *post mortem* examination the cause of death was first supposed to be oxalate, and then a narcotic poison. Chemical investigation showed that the liver, kidneys, lungs, heart, and brain were impregnated with arsenic, though the œsophagus contained not a trace, and the stomach with its contents gave a barely perceptible arsenical mirror. The general circumstances of the case excluding the suspicions of suicide and malicious poisoning, it was found that the deceased had been in the habit when drawing of placing the pencil filled with color between his lips in order to point it. The water colors he had used were analyzed, and while Indian ink, gamboge, carmine, blue, red eosin ink, and neutral tint were found perfectly free from arsenic, a sample of sepia contained 3·08 per cent of arsenious acid, terra di Sienna 3·14, and a reddish brown color, the name of which was indistinct, 3·15. Burnt Sienna, Vandyck brown, bister, bladder green, brown ocher, Indian red, umber, raw and burnt, were also found arseniferous. Most of these colors are essentially iron lakes. Hence it appears that the mere presence of ferric oxide, except in a hydrated state and accompanied by free magnesia in quantity sufficient to neutralize the acids of the stomach, does not act as an antidote to arsenious acid. This case seems likewise to prove that arsenic taken in minute doses can accumulate in the system until it can be readily recognized in all organs, and can exert a dangerous action. This result seems to prove that the impunity with which the peasants of Styria consume small doses of arsenic must depend upon circumstances not yet fully understood.